

Report from the Review of the Methodology used for the UKCP climate change projections

13 and 14 January 2009

The Review Group would like to emphasise that the work performed by the Met Office Hadley Centre (MOHC) and by other Weather Generator and Marine Report contributors was at a very high level. The methodologies used are credible, though sometimes very complex. UKCP represents a large step beyond UKCIP02.

In response to user request, the scope of the UKCP commission included the quantification of uncertainty, taking account of climate models from centres other than MOHC, inclusion of new developments such as carbon cycle feedback, and the production of daily data on a 5km grid. Trying to fulfil this scope stretched the ability of current climate science and methodology. There is a cascade of confidence in climate projections. There is very high confidence in the occurrence of global warming due to human emissions of greenhouse gases. There is moderate confidence in aspects of continental scale climate change projections. 25km scale climate change information is indicative to the extent that it reflects the large-scale changes modified by local conditions. There is no climate change information in the 5km data beyond that at 25km. All that can be produced is a range of examples of local climates consistent with current larger-scale model projections. The confidence in the climate change information also depends strongly on the variable under discussion. For example, for UKCP no projections are given for regional or local wind changes.

The focus on UK-scale climate change information should not obscure the fact that the skill of the global climate model is of over-whelming importance. Errors in it, such as the limited current ability to represent European blocking, cannot be compensated by any downscaling or statistical procedures, however complex, and will be reflected in uncertainties on all scales.

There is a tension between using the more robust IPCC approach of employing only results or methods that have been tested through publication and peer evaluation with the understandable desire to satisfy the user requirements. In trying to fulfil the required scope in a timely fashion, important aspects of the UKCP methodology have not yet been published, and there are risks in this. Therefore as part of UKCP a more complete and formal description of the methods (plus a simple summary) should be provided, including in the material more comparisons with other methods where possible, and as many of the available evaluations and sensitivity tests as possible. It is also vital to produce journal papers on the methodology as soon as possible after the launch.

In view of these risks, the Review Group recommended that users should also be provided with a version of the Land Projections based on a more traditional methodology. This would give a simpler, complementary picture for the users and could provide a more convenient first data set for many of them.

The guidance that will be given to users of UKCP was not looked at by the Group, but it felt that the guidance must be very strongly advised by the science. The guidance should very clearly state the assumptions behind the approach, and the limitations of the data that the users are provided with. It should give very firm guidance as to the uses that should and should not be made of the data, with concrete examples where possible. In particular it should include a reference to the assumptions underlying the estimation of the projected

probabilities (discussed in detail in the technical documentation), and detailed discussion of how the projected probabilities should be interpreted, and what they can and cannot be used for. Examples of analyses using projection products based on more traditional methodologies should be contrasted and discussed. The guidance must be reviewed by experts in the relevant scientific areas.

As well as the more complete supporting material on the methodology discussed above, the Report accompanying UKCP should also succinctly emphasise the points made in this review on the cascade of confidence and the importance of the global model, and the underlying assumptions and nature of the probability projections should be clarified.

The Group consider that an expert review nearer the beginning of any future UKCP process would enable a better compromise between the natural desires for information by the users and the current ability of the science to provide it, and a very helpful broad discussion of the methodologies that could be used.

The Review Group is pleased to note that all the detailed points raised in the individual written reviews by its members (attached in the Annex to this report) and in the review meeting discussion will be fully addressed.